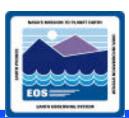


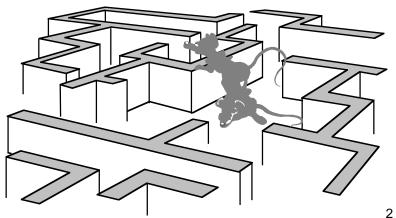
SOFTWARE MAINTENANCE

ECS Pre-Release B Testbed Training

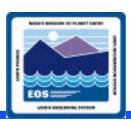
Overview of Lesson



- Introduction
- Software Maintenance Topics
 - Software Maintenance Objectives
 - Maintenance of COTS Software
 - Maintenance of Custom Software
- Practical Exercise

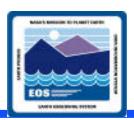


Objectives



- Overall: Proficiency in methodology and procedures for installation, troubleshooting, and maintenance of ECS software
 - Describe management of software maintenance contracts
 - Describe management of software licenses
 - Install, configure, and promote COTS software using ClearCase®
 - Obtain COTS software support
 - Describe safeguards for COTS software media
 - Install, configure, and promote custom software using ClearCase®
 - Obtain custom software support
 - Describe safeguards for custom software media

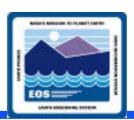
Importance



Lesson helps prepare several ECS roles for effective software installation, troubleshooting, maintenance, and problem resolution:

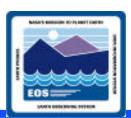
- DAAC System Administrator, Software Maintenance Engineer, and Maintenance Coordinator
- SEO System Administrator, Software Maintenance Engineers, System Engineers, System Test Engineer
- DAAC System Engineers, System Test Engineers, Maintenance Engineers
- ILS Logistics Engineer

Software Maintenance Objectives



- Adaptive Maintenance (AdM) adapt software to changes in the data or processing environments (e.g., upgraded computer system)
- Corrective Maintenance (CrM) identify and correct failures in software, performance, or implementation (e.g., design defect)
- Perfective Maintenance (PfM) enhance performance, improve effectiveness, efficiency, or maintainability (e.g., improve productivity)
- Preventive Maintenance (PvM) prevent or reduce impact of anticipated problems (e.g., reallocation of resources to meet projected demand)

Maintenance Categories



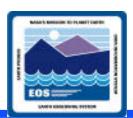
Elevated to Government Failure Review Board

- Category 1: System/service cannot perform critical function or imposes major safety hazard
- Category 2: System/service substantially impaired
- Category 3: System/service slightly impaired

Additional SEO Categories

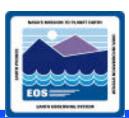
- Category 4: Nuisance problem
- Category 5: Closed problem

Analysis of Maintenance Priorities



- Annual software maintenance effort
- Software age
- Programming language
- Error information and correlation data
- Software change information
- User satisfaction, perception of utility
- Effort required for fix or change
- Software conformance to performance/data models
- Interfacing difficulties
- Effect on mission success

COTS Software Maintenance



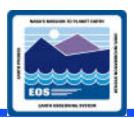
Issues

- Software use licenses
- Obtaining telephone assistance
- Obtaining software patches
- Obtaining software upgrades

Vendor support contracts

- First year warranty
- Subsequent years contracts
- Database at ILS office
- Contact ILS Logistics Engineer
 - E-mail: ilsmaint@ecs.hitc.com
 - Telephone: 1-800-ECS-DATA (327-3282)

COTS Software Licenses

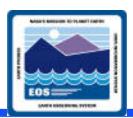


Maintained in a property database by ECS Property Administrator

Major COTS Software License Restrictions

Software	Restriction	
HP OpenView	TBD	
AutoSys	Only one instance at a time may be active	
ClearCase®	Five users concurrently	
DDTS	Virtually unlimited (10,000 users)	

COTS Software Installation



- Configuration Management and tools required (e.g., ClearCase® for customized files)
- Final Version Description Document (VDD) published
- Build installed, with documentation
 - ClearCase®
 - Scripts for System Administrator
- Controlled document updates entered into CM
- CM baseline updated

COTS Software Support



Systematic initial troubleshooting

- Software Event Browser to review event sequence
- Review error messages, prepare Trouble Ticket (TT)
- Review system logs for previous occurrences
- Attempt software reload
- Report to Maintenance Coordinator (forward TT)

Additional troubleshooting

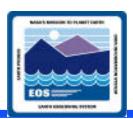
- Procedures in COTS manuals
- Vendor site on World Wide Web
- Software diagnostics
- Local procedures
- Adjustment of tunable parameters

COTS Software Support (Cont.)



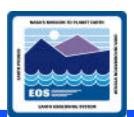
- Organize available data, update TT
 - Locate contact information for software vendor technical support center/help desk (telephone number, name, authorization code)
- Contact technical support center/help desk
 - Provide background data
 - Obtain case reference number
 - Update TT
 - Notify originator of the problem that help is initiated
- Coordinate with vendor and CM, update TT
 - Work with technical support center/help desk (e.g., troubleshooting, patch, work-around)
 - CCB authorization required for patch

COTS Software Support (Cont.)



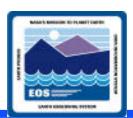
- Escalation may be required
 - Lack of timely solution
 - Unsatisfactory performance of technical support center/ help desk
- Notify SEO
 - Senior Systems Engineers
 - ILS Logistics Engineer coordination for escalation within vendor organization

Safeguarding COTS Software Media



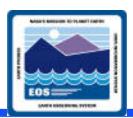
- Locked cabinets at DAAC for software and documentation
- Access through on-duty Operations Coordinator

Maintenance of Custom Software



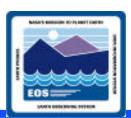
- Code maintained at ECS Development Facility
- ClearCase® for library storage and maintenance
- Module/component definitions defined by development organization
- CM requirements apply
- Sources of maintenance changes
 - ESDIS CCB directives
 - Site-level CCB directives
 - Developer modifications or upgrades
 - Trouble Tickets

Implementation of Modifications



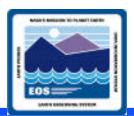
- Responsible Engineer (RE) selected by each ECS organization
- SEO RE establishes set of CCRs for build
- Site/Center RE determines site-unique extensions
- SEO RE maintains CCR lists and schedule
- Acceptance Test Organization (ATO) provides initial VDD
- SEO RE maintains VDD
- RE or team for CCR obtains source code/files, implements change, performs programmer testing, updates documentation

Test Plans and Procedures



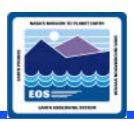
- Test program addresses features (from CCR) and regression (revalidation of proper operation)
- Test team (programmers, vendors, users, originator of problem)
- Verification
 - Inspection
 - Analysis
 - Demonstration
 - Review of test data
- Testing
 - Feature (new test cases, data)
 - Regression (standard test cases, expected results)
- Test teams provide results to SEO and center REs

Installing Custom Software



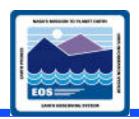
- Requirements similar to those for COTS software, but configuration under ClearCase® control
- Versioned Object Base (VOB) holds controlled files (a virtual directory tree)
- View provides user-defined mapping to files in VOB

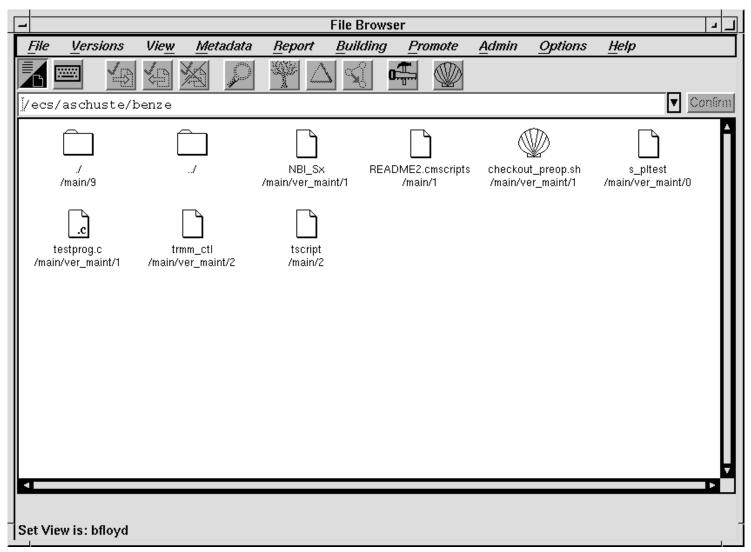
ClearCase® View Tag Browser Screen



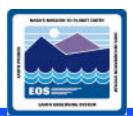
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ClearCase® File Browser Screen (Main Screen)



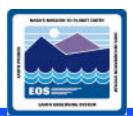


Implementation and Test



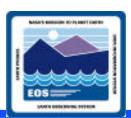
- Software Maintenance Engineer actions
 - Software transfer to compiler hosts for make and build
 - Software distribution
 - Individual package tests
 - Final software run in operational environment
 - Notify SMC of results
- Promote software into operational baseline

Controlling Maintenance for Custom Software



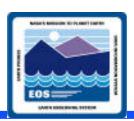
- Scheduled maintenance approach
 - Efficiency in updates, reduced disruption, decreased costs
 - Time for reflection on needed changes
 - Efficiency in assessment
 - Facilitated management and priority setting
 - Baseline management control

Version Description Document



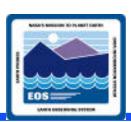
- VDD is vehicle for communicating installation data to ECS operations and users
 - Test plans, test procedures, test results are supplements to the VDD
 - Draft and final VDD published and distributed
- Golden copy of ECS custom software maintained by the SEO CM Administrator
- Custom software also maintained by site CM Administrator

Custom Software Support



- Responsible Engineers help with software configuration items
- Science software maintenance not responsibility of ECS on-site maintenance engineers
- Sources of Trouble Tickets for custom software
 - Anomalies
 - Apparent incorrect execution by software
 - Inefficiencies
 - Sub-optimal use of system resources
 - TTs may be submitted by users, operators, customers, analysts, maintenance personnel, management
 - TTs capture supporting information and data on problem

Custom Software Support (Cont.)



- Troubleshooting is ad hoc, but systematic
 - Site Operations Supervisor assigns TT to problem investigator
 - Responsible Engineers available at SEO and ECS Development Facility (EDF)
 - EDF has software and computer equipment reflecting that at sites; may be able to duplicate problem and derive solution or work-arounds
 - Failure Review Board (in TT telecon) assigns priority to TT, and assigns TT to an organization
 - Assigned RE at organization conducts technical investigation
- For problem caused by non-ECS element, TT and data are provided to maintainer at that element

Custom Software Support (Cont.)



Potential TT results

- Description of source of problem and recommended change to design/implementation or procedure
- Modification to procedures
- Tracking of problem for further technical investigation
- Resetting of priorities for TT, higher or lower
- Close TT with URDB input to document a recommendation for change in requirements
- Close TT into existing TT or CCR

Safeguarding Custom Software Media



- Code maintained at ECS Development Facility
- Access through telnet